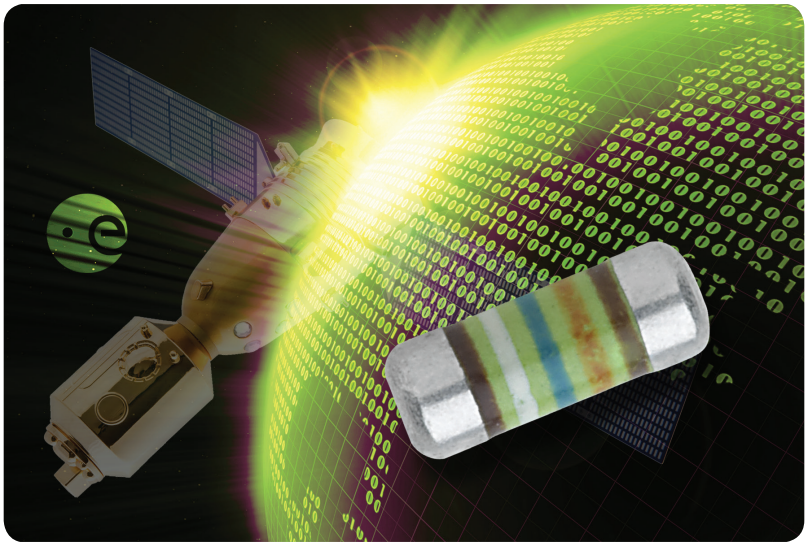
THIN FILM RESISTORS

MS1....ESCC

Hi-Rel Thin Film MINI-MELF Resistors



KEY BENEFITS

- High-reliability product
- ESA-approved to ESCC 4001/022
- Advanced thin film technology
- SnPb termination plating, minimum 6 % Pb

APPLICATIONS

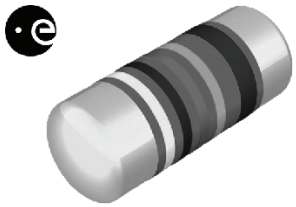
- Aerospace
- Avionics
- Military

RESOURCES

- Datasheet: MS1....ESCC: http://www.vishay.com/doc?28790
- For technical questions contact specialresistors@vishay.com

A WORLD OF SOLUTIONS

Hi-Rel Thin Film MINI-MELF Resistors



MS1 .... ESCC high-reliability thin film MINI-MELF resistors are the premium choice for the design and manufacture of equipment where matured technology and proven reliability are of the utmost importance. They are regularly used in communication and research satellites and fit equally well into aircraft and military electronic systems.

Approval of the MS1 .... ESCC is granted by the European Space Components Coordination and registered in the ESCC Qualified Parts List, REP005.

FEATURES

- High-reliability product
- ESA approved to ESCC 4001/022
- Advanced thin film technology
- SnPb termination plating, minimum 6 % Pb

APPLICATIONS

- Aerospace
- Avionics
- Military

METRIC SIZE	
DIN	0204
CECC	RC3715M

TECHNICAL SPECIFICATIONS	
DESCRIPTION	**MS1 .... ESCC**
CECC size	RC3715M
Resistance range	2.21 Ω to 5.11 MΩ
Resistance tolerance	± 1 %; ± 0.5 %; ± 0.1 %
Temperature coefficient	± 50 ppm/K; ± 25 ppm/K; ± 15 ppm/K
Rated dissipation P_{70}	0.25 W
Operating voltage, $U_{max.}$ AC_{RMS} or DC	200 V
Permissible film temperature, $\vartheta_{F\ max.}$	125 °C
Operating temperature range	- 55 °C to 125 °C
Max. resistance change at P_{70}, $\lvert\Delta R\rvert$ max., after:	
1000 h	≤ (0.35 % R + 50 mΩ)
2000 h	≤ (0.5 % R + 50 mΩ)
Permissible voltage against ambient (insulation):	
1 min; $U_{ins\ RMS}$	500 V
Storage temperature range	-65 °C to +155 °C

Note

- These resistors do not feature a limited lifetime when operated within the permissible limits. However, resistance value drift increasing over operating time may result in exceeding a limit acceptable to the specific application, thereby establishing a functional lifetime.

TEMPERATURE COEFFICIENT AND RESISTANCE RANGE		
DESCRIPTION		**RESISTANCE RANGE**
TCR	**TOLERANCE**	**MS1 .... ESCC**
± 50 ppm/K	± 1 %	2.21 Ω to 5.11 MΩ
± 25 ppm/K	± 0.5 %	10.0 Ω to 1.00 MΩ
	± 0.1 %	43.2 Ω to 1.00 MΩ
± 15 ppm/K	± 0.1 %	43.2 Ω to 221 kΩ

Notes

- The indicated combinations of TCR, tolerance and resistance range are a subset of those combinations approved to ESCC 4001/022
- According to ESCC 4001/022, resistance values are to be selected from the E96 series only

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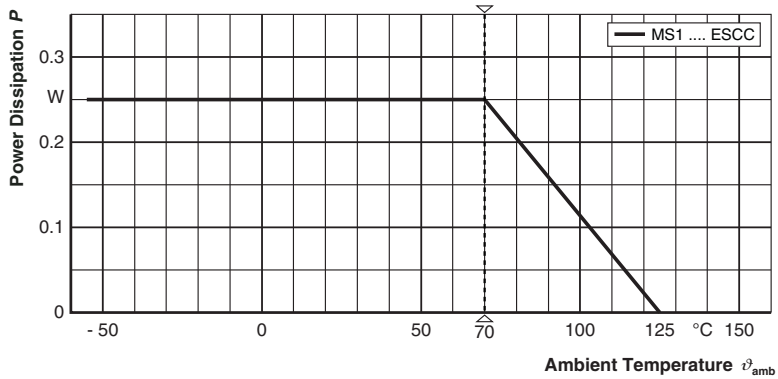
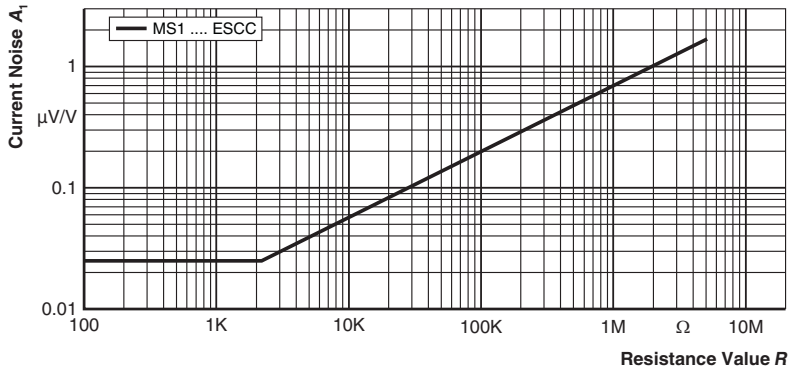
Hi-Rel Thin Film MINI-MELF Resistors

FUNCTIONAL PERFORMANCE

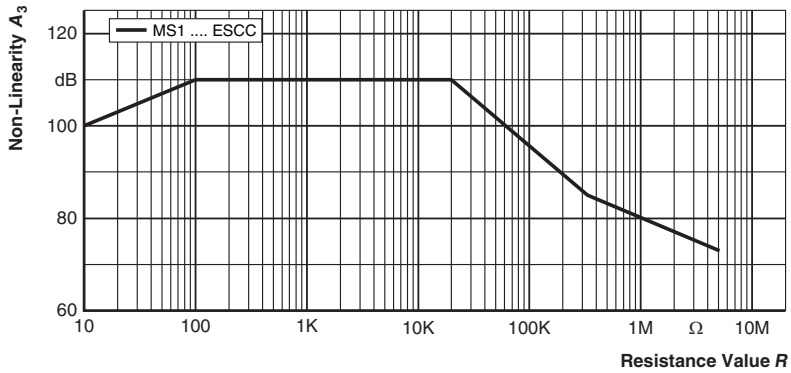


Derating



In accordance with IEC 60195

Current Noise - A_1



In accordance with IEC/TR 60440, superior requirements adopted from EN 140401-803

Non-linearity - A_3

Hi-Rel Thin Film MINI-MELF Resistors

DESCRIPTION

Production is strictly controlled and follows an extensive set of instructions established for reproducibility. A homogeneous film of metal alloy is deposited on a high grade ceramic body (Al_2O_3) and conditioned to achieve the desired temperature coefficient. Nickel plated steel termination caps are firmly pressed on the metallized rod. A special laser is used to achieve the target value by smoothly cutting a helical groove in the resistive layer without damaging the ceramics. The resistor elements are covered by a protective coating designed for electrical, mechanical and climatic protection. The terminations receive a final SnPb plating, controlled for a minimum lead content of 6 %. Five color code rings designate the resistance value and tolerance in accordance with **IEC 60062** (1).

The result of the determined production is verified by an extensive testing procedure performed on 100 % of the individual resistors. Only accepted products are placed into a special matrix case packaging or into antistatic blister tape in accordance with **IEC 60286-3** (1).

ASSEMBLY

The resistors are suitable for processing on automatic SMD assembly systems. They are suitable for automatic soldering using wave, reflow, or vapor phase as shown in **IEC 61760-1** (1). The encapsulation is resistant to all cleaning solvents commonly used in the electronics industry, including alcohols, esters, and aqueous solutions. The suitability of conformal coatings, if applied, shall be qualified by appropriate means to ensure the long-term stability of the whole system. Solderability is specified for 2 years after production. The permitted storage time is 20 years.

APPROVALS

The resistors are approved to **ESCC 4001/022**. Conformity is indicated by the **ESCC Qualified Components** logo on the package label. Approval is granted by the European Space Components Coordination and registered in the ESCC Qualified Parts List, REP005.

SCREENING TESTS

These products are subjected to a screening test according to the ruling of the generic specification **ESCC 4001** and the detail specification **ESCC 4001/022**.

The production is succeeded by production test sequences for resistance, plating properties, solderability, and dimensions. This sequence is followed by screening tests for overload, non-linearity, temperature coefficient, resistance at room temperature, and a visual inspection. A certificate of conformity provides summary information by reporting the numbers of rejects for each test or inspection.

The requirements for burn-in with measurement of resistance drift, for a test of bend strength of the end face plating, and for a vibration test are waived by the detail specification **ESCC 4001/022**. The seal test is not applicable since MS1 is not a hermetically sealed product.

LOT VALIDATION TESTS

Execution of Lot Validation Tests according to the ruling of **ESCC 4001** is available as a separate order item. This is to be combined with the dedicated order line for the required amount of samples, using packaging code “LX”.

The applicable scope of the Lot Validation Tests, graduated to Group 1, Group 2, and Group 3, is illustrated in the datasheet with the number of samples required for each level.

Deliverable item to the Lot Validation Tests is the test report together with the used samples.

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